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THE  
VALUE OF SURGERY IN LEPROSY,

By BEAVEN RAKE, M. D., (Lond.,)

MEDICAL SUPERINTENDENT OF THE TRINIDAD LEPER ASYLUM.

Our present knowledge, we are reluctantly compelled to admit, is powerless to cure leprosy. This fact being established, there is I fear too often a tendency to become discouraged and not only to abandon efforts to cure, but also to neglect many measures which can materially relieve those suffering from the disease. I have for some time been of opinion that surgery can do far more than medicine in the palliative treatment of leprosy, and it has seemed that a fitting subject for this the jubilee year of the *ST. LOUIS MEDICAL AND SURGICAL JOURNAL* will be a short retrospect of surgical work done in the Trinidad Leper Asylum during a period of six years.

*A priori*, it might be supposed that in a wasting exhausting disease like leprosy wounds, would heal slowly and imperfectly, and that troublesome chronic suppuration might be set up with consequent lardaceous and other changes. This we know is often the case in tuberculosis, a disease which every year is shown to be more and more closely allied to leprosy. Experience, however, tells us that this is not the case. Incisions in lepers usually

heal with astonishing rapidity, producing firm cicatrices as quickly as in non-leprous subjects. Indeed healing sometimes seems to take place more rapidly in lepers than in those who are free from the disease.

I have naturally been led to search for the cause of this rapid healing, and I think that an explanation may perhaps be found in the rapid clotting which takes place in the blood of lepers. This is usually so marked that the labor of tying or twisting bleeding points is very materially lessened in operations on lepers. Occasionally the blood coagulates so rapidly that if a minor operation such as incision of a sinus is done over a basin of water, the blood settles at the bottom of the vessel in round compact clots.

The fibrin in the blood of lepers has been estimated by Danielssen and Boeck\* who found in fourteen analyses that the percentage ranged from 0.22 per cent. to 0.6 per cent. Hillairet† also in three analyses found the percentage to be from 0.31 to 0.61. In fifty analyses which I made at the Trinidad Leper Asylum‡ I found the range to be from 0.12 to 1.87, the average being 0.76. It is quite possible that my percentage may be rather high by reason of a somewhat rough method of analysis, but even allowing a margin for errors of experiment, the results will I think be considerably above 0.2 per cent. the amount of fibrin present in normal blood. I am now engaged in making further and more exact analyses.

Another fact which seemed to indicate the facility with which the blood of lepers coagulates was the discovery in the body of an anæsthetic female leper who died in the Trinidad Asylum of a large thoracic aneurism filled with firm laminated clot.§ The centre of the clot had begun to break down into grumous débris.

Whatever the explanation, the fact remains that lepers heal well when operated on, and we now come to the practical details. I propose first to give a short table showing the chief operations done at the Trinidad Leper Asylum during a period of six years, and then to make a few remarks on the various operations, giving some illustrative histories.

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\* *Traité de la Spedalskhed*, pp. 238, 296.

† *Ann. de Dermat. et de Syphilis*, tome V. No. 3.

‡ *Lancet*, Jan. 9, 1892, p. 83.

§ *Path. Soc. Trans. Lond.* Vol. XXXVIII, p. 120.

# OPERATIONS PERFORMED IN THE TRINIDAD LEPER ASYLUM DURING A PERIOD OF SIX YEARS.

OPERATION.	FORM OF LEPROSY.									
	Tuberculated.		Anæsthetic.		Mixed.		Total.		Grand Total.	
	M	F	M	F	M	F	M	F		
<i>Amputation</i>										
Through thigh.....	1		1				2		2	
knee.....			1				1		1	
leg.....			2	1	2	1	4	2	6	
ankle.....			1				1		1	
Of great toe.....	1		21	1	3		25	1	26	
toe.....			34	1	1		35	1	36	
Through arm.....			2				2		2	
Of thumb.....			1			1	1		2	
finger.....			31	2	8		39	2	41	
<i>Stretching of</i>										
Sciatic.....		1	20	2	6		26	3	29	
External popliteal.....			8	1	3		11	1	12	
Median.....	3	3	23	3	8	2	34	8	42	
Ulnar at elbow.....	3	1	7	1	7		17	2	19	
wrist.....	1		3		1		7		7	
Supra orbital.....			3				3		3	
Facial.....					1		1		1	
<i>Removal of</i>										
Necrosed bone or cartilage.....	4	2	509	23	92		605	25	630	
Tubercles from face or arm.....	13	10			8	3	21	13	34	
conjunctiva.....	1				1		2		2	
Exuberant granulations.....	2		8		5		15		15	
Recurrent keloid.....			3				3		3	
Papilloma.....			1				1		1	
Fibroma.....			3				3		3	
Yaws Tubercles.....			1		1		2		2	
Eyeball.....			1				1		1	

OPERATIONS PERFORMED IN THE TRINIDAD LEPER ASYLUM DURING A PERIOD OF SIX YEARS.—Continued.

OPERATION.	FORM OF LEPROSY.									
	Tuberculated.		Anæsthetic.		Mixed.		Total.		Grand Total.	
	M	F	M	F	M	F	M	F		
<i>Removal of</i>										
Belly of gastrocnemius.....				1				1	1	
Hæmorrhoids.....			1				1		1	
Enlarged gland.....			1				1		1	
Cyst.....					1		1		1	
<i>Ligature of</i>										
Vessels supplying tubercle of conjunctiva.....	3				2		5		5	
Hæmorrhoids.....			1				1		1	
<i>Incision</i>										
Of abscess, sinus, ulcer, or to relieve tension.....	33	7	786	46	141	3	960	56	1016	
patellar bursa.....			1				1		1	
cyst of ear.....			1				1		1	
For elephantiasis.....	1						1		1	
Tracheotomy.....					1		1		1	
Circumcision.....	10		3		3		16		16	
<i>Intestinal Operations.</i>										
Herniotomy.....			1				1		1	
Linear cauterization of prolapsed rectum.....			1				1		1	
<i>Ophthalmic Operations.</i>										
Extraction of cataract.....			3	1	1		4	1	5	
Iridectomy.....			3		3		6		6	
For pterygium.....	5		1				6		6	
Tattooing eye.....					1		1		1	
<i>Miscellaneous.</i>										
Skin grafting.....				5				5	5	
Paracentesis abdominis.....	2	2					2	2	4	
TOTAL.....	83	26	1487	88	300	10	1872	124	1996	



From this table it will be seen that during the period already mentioned some 1,996 operations were performed. I have put down the period as six years, for although I have now been connected with the asylum for nine years, I have been absent from the colony for nearly three years at one time and another, and I have thought it better to consider only the operations done by myself, as I can speak of them more fully and readily than of those done by others. It may be well to state here that when I arrived in the colony in 1884 the number of beds at the Asylum was 146—102 male and 44 female. There are now 216 beds—166 male and 50 female. It will of course be understood that the number of operations given in the table does not represent an equal number of patients. Many separate operations are often done on one patient. These may be of the same kind or of different kinds.

On looking at the table it is at once evident that by far the most operations were performed on anæsthetic lepers. Thus 1,487 were done on anæsthetic males and 88 on anæsthetic females. Amongst tuberculated lepers only 83 males were operated on, and 26 females, while mixed leprosy occupies an intermediate position, the operations on males numbering 300 and those on females 10.

The number of women in the Asylum is 50 out of 216 or rather less than a quarter of the inmates. Nine years ago as already pointed out, the female beds were 44 out of 146, or rather less than a third. The total operations on women are, however, only 124 out of 1,996. To preserve the ratio they ought to be about 500. This lower proportion of operation cases amongst the female lepers is doubtless explained by the fact that they do less hard out-of-door work than the men. The latter are allowed to cultivate gardens and to keep half the proceeds of the sale of the vegetables they raise. The love of gain often prompts them to work beyond their strength, and the results are ulcers and abscesses of the fingers and hands caused by friction of the gardening tools against the anæsthetic skin. Necrosis of bone often follows, especially amongst the East Indian inmates, in whom the love of making and hoarding money is far more dominant than in the negroes.

The various operations may now be briefly commented on:

*Amputations.*—Two amputations through the thigh were performed. One in a tuberculated leper was done at the patient's request in order to get rid of a leg which was affected with elephantiasis Arabum.\* Free incision through the thickened subcutaneous tissue had been tried, but only slight and temporary diminution in the size of the leg had been obtained.

The flaps united rapidly—indeed too rapidly, for in fourteen days the boy died of pyæmia, the necropsy showing infarcts in the lung. I regretted afterwards that I had not left the flaps open in order to ensure absolutely free drainage, but the infiltration had not extended above the knee, and a drainage tube was fixed in the stump.

The existence of leprosy and elephantiasis Arabum in the same patient is very rare. Vincent Richards† examined 636 patients suffering from elephantiasis at Balasore, and found only two lepers amongst them. I have never seen another case in which the two diseases were present together.

The second case of amputation through the thigh was done for gangrene of the foot and leg, when the patient was almost moribund.‡ The stump healed in three months, some delay having been occasioned by sloughing of the flaps. The patient died five years and nine months later of granular kidney and dysentery. In this case there is every reason to believe that the operation prolonged life during the period mentioned.

An amputation through the knee§ was done for a similar reason—leprosy gangrene. In this case there was considerable sloughing of the flaps. The patella and much dead tissue were subsequently removed. The stump never entirely healed, but a granulating surface some three inches in diameter was left. The patient died of pleuro-pneumonia one year and ten months after the operation. It is probable that in this case the freely discharging, granulating stump did much good by acting as an efficient drain. The patient was a Portuguese and it is noteworthy that lepers of this nationality get the disease very badly.

In these two cases I was not surprised to find sloughing of the flaps, for I amputated before the line of demarcation had formed, a proceeding usually condemned in operations for gangrene. I

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\* *Lancet*, Jan. 25 1890, p. 194.

† Fox and Farquhar. *Skin Diseases of India*. Appendix VIII. p. 135.

‡ *Brit. Med. Journal*, March 7, 1885, p. 481, and March 1, 1890, p. 477.

§ *Ibid.*



believe that had I waited for the line to form, both lives would have been sacrificed.

The six amputations through the leg were also for ulceration and gangrene. One was done at the request of a patient *in extremis*, to relieve pain and remove the stench of the gangrene and so indirectly promote euthanasia. These results were attained, the patient living about four days after the operation, in comparative comfort. In another case the patient sank soon after the amputation, exhausted by the long continued suppuration, and unable to stand the additional drain caused by the hemorrhage attending the operation. Two other patients died from other diseases at varying times after their legs were removed, while the other two are still living and in fair health. One of these cases has already been published in this JOURNAL.\* The other may be given here:

CASE I.—*Anæsthetic Leprosy; Perforating Ulcer of Heel; Stretching of Great Sciatic; Temporary Improvement; Subsequent necrosis of bones and gangrene of foot; Amputation of Leg; Recovery.*

Mahdsinghu, Hindu, aged 40, was admitted to the Trinidad Leper Asylum on September 9, 1887, with anæsthetic leprosy of three years' duration. There was almost complete anæsthesia of the lower extremities, the skin being pale, shining, and scaly. The hands were anæsthetic and there were numerous anæsthetic patches on the upper extremities. Over the left heel was a perforating ulcer almost half an inch deep, and to the inner side of the heel was a superficial ulcer. The whole of the foot was swollen and he said it felt heavy, there was also an ulcer on the middle toe of the right foot.

Sept. 23. He was given chloroform, and the left sciatic nerve was stretched. At the same time the right external popliteal and the left median were stretched. The incisions were closed with silk sutures.

Sept. 26. The sutures were removed from the incision over the sciatic. There was pain, but not much discharge. The incision over the median was found to have healed by first intention, and that over the external popliteal had nearly healed. Sensation appeared to have improved in the left hand, but not in the left foot. There was increased discharge from the perforating ulcer.

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\* ST. LOUIS MEDICAL AND SURGICAL JOURNAL, June 1888, page 337.

Sept. 30. The incision over the sciatic was gaping and filling up with healthy granulations. The ulcer over the heel was slightly smaller.

Oct. 5. The ulcer on the left heel was nearly covered with a thin cicatrix, also that on the right middle toe.

Nov. 2. The ulcer on the left heel was nearly healed, and that on the right middle toe quite healed.

Feb. 3, 1889. The right great toe and the whole foot were found to be swollen.

Feb. 6. The toe was incised and fragments of bone were removed.

Feb. 15. The head of the first metatarsal bone and other fragments were removed from the right great toe.

Toward the end of 1889, a few more fragments of bone were removed.

During the first four months of 1890, necrosis and ulceration of the right foot progressed more rapidly. Several sinuses formed in the sole and were slit up. Much dead bone and sloughing tendon were removed.

April 16, 1890. The right calcaneum was found to be carious.

April 29. All the slough was found to have come away from the foot, and healthy looking granulations had formed.

May 2. The foot suddenly became swollen and blue. There was some induration above the heel. Numerous superficial incisions were made to relieve tension.

May 6. A line of demarcation had formed. The patient asked for amputation.

May 7. He was given chloroform, and the leg was amputated at the upper third. The anterior and posterior tibial and external popliteal arteries were ligatured. The flaps were closed with wire sutures and a drainage tube was put in.

Dissection of the amputated limb showed the line of demarcation to be well formed. The gangrene had reached the ankle-joint and the cartilages were discolored. Pus was burrowing upwards along the tendons round the joint. Induration extended up the calf as far as the line of amputation.

May 12. There was a little smell from the stump and the cut end of the bone was found to have perforated the skin.

May 21. The drainage tube was removed.

May 25. The stump was healed, except the two extremities of the incision, and where the bone projected.

June 4. The bone was completely covered with granulations.

June 25. The necrosed anterior edge of the cut end of the tibia was removed. The stump completely healed two or three weeks later, and he was soon afterwards going about on a wooden leg.

Two main points are noteworthy in this case; first, the temporary improvements as shown by the healing of the ulcer, which followed nerve stretching; and, secondly, the rapid healing which took place after amputation in spite of the drain which he had suffered from long continued suppuration and eventual gangrene. As was pointed out above, there is reason to believe that a freely discharging surface often does good in leprosy.

One amputation was performed through the ankle joint, also for ulceration and gangrene.

Amputation of the great toe was found necessary in 26 cases. Necrosis of the bones of the great toe is very common, the disease sometimes beginning in the toe, and sometimes spreading from a perforating ulcer further back. When all the bone has come away piecemeal, a useless flail-like member is left, which impedes walking, and which the patient usually begs to have removed.

The same remarks apply to amputation of other toes, which operation was performed thirty-six times. If once the bone begins to come away in any quantity and with rapidity, the toe seldom closes satisfactorily, and operative interference is usually necessary. Where the process of elimination is more gradual, the tissues adapt themselves better, and greatly shortened toes may often be seen in which the nail is transposed from the last to the first phalanx, all the intermediate phalanges having been thrown off or absorbed.

The two cases of amputation of the arm have already been published.\* They were both of them done for diffuse acute suppuration which had traveled from the hand up the forearm, burrowing amongst the muscles. In one case there was a firm cicatrix in twenty-seven days, and the patient gained flesh. He died, however, eight months later of phthisis. In the second case, the patient, a Hindu, died of hæmorrhage after the amputation, the fatal result, no doubt, being assisted by the long continued suppuration which had rendered the operation necessary.

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\* *Brit. Med. Journ.*, Sept. 19, 1885, p. 545.



To the amputation of thumbs and fingers the same remarks apply as in the case of toes. A rapid and firm cicatrix is usually obtained. In nine patients I have found constriction of fingers and toes closely resembling the condition known as ainhum. In several cases the extremity hung by a narrow pedicle, and a snip with a pair of scissors was all that was necessary to separate it. All the bone had usually disappeared from the end thus constricted. I have not yet arrived at a satisfactory explanation of the cause of this condition.

*Nerve-Stretching.*—The next group of operations to be considered is the stretching of various nerves. The operation has been done 113 times at the Trinidad Asylum. As an account of the cases has already been published,\* it will be sufficient to give a short summary of the results obtained. One hundred cases have been taken, in order that percentages may be more readily seen. An analysis of the cases is shown in the following table:

	Tuber- culated.		Anæsthetic.		Mixed.		Total.
	M	F	M	F	M	F	
Total cases .....	7	5	57	7	22	2	100
Total patients operated on.....	3	3	36	4	13	1	60
<i>Nerves stretched.</i>							
Sciatic .....	.....	1	17	2	6	.....	26
External popliteal.....	.....	.....	7	1	3	.....	11
Median .....	3	3	22	3	7	2	40
Ulnar at elbow.....	3	1	8	1	5	.....	18
Above wrist.....	1	.....	2	.....	1	.....	4
Supra orbital .....	.....	.....	1	.....	.....	.....	1
							100
<i>Reasons for operation.</i>							
Ulceration .....	.....	3	21	4	10	.....	38
Pain .....	.....	.....	7	.....	2	.....	9
Anæsthesia .....	2	.....	27	3	1	.....	33
Tuberculation.....	5	2	.....	.....	9	2	18
Necrosis .....	.....	.....	2	.....	.....	.....	2
							100
<i>Results of operation.</i>							
Relief.....	.....	3	30	4	10	.....	47
No relief.....	7	2	24	3	11	2	49
Doubtful .....	.....	.....	3	.....	1	.....	4
							100
<i>State of nerve when exposed.</i>							
Enlarged .....	5	3	27	1	10	2	48
Not enlarged.....	.....	2	18	5	9	.....	34
Not noted.....	2	.....	12	1	3	.....	18
							100

\* *Brit. Med. Jour.* Dec. 22, 1888, p. 1378.

Victor Horsley has shown that when the lumbar cord is exposed in the dead body, and the great sciatic nerve is stretched, the stretching is observed to extend to the sacral plexus, and the nerve roots are dragged down, shaking the cord. This experiment was repeated at the Trinidad Asylum with similar results.

Starting with the theory that the changes observed after nerve stretching are due to disturbances in the spinal ganglia produced by this shaking, it would be expected that in practice the best results would be obtained after stretching of the great sciatic, which is nearer the ganglia than any other nerve usually operated on. This is found to be actually the case.

I will now briefly review the reasons for which nerve stretching has been done in Trinidad lepers.

*Ulceration.*—Various nerves were stretched in 38 of the 100 cases. More or less relief was obtained, especially in perforating ulcers of the soles. These often healed in a few days. A fallacy which must be borne in mind here is, that stretching of the sciatic necessitates remaining in bed for some days, and it is therefore difficult to say to what extent the good result is due to this rest. It has always seemed to me that the rapid growth of granulations increased discharge, and thin, white cicatrix, spreading from the edge of the ulcer within a few days, point to a direct trophic influence more rapid in its effect than mere rest. Unfortunately, perforating ulcers treated in this way have a tendency to break down again; and, as I shall show presently, I have since found a more effectual way of dealing with them.

*Pain.*—Very definite results were obtained in those cases in which nerve stretching was done to relieve pain, especially when this was associated with perforating ulcer. There were nine such cases in the 100. In two of these the pain was so severe that the patients begged for amputation, but after the nerves were stretched the pain vanished almost at once.

In another case the right sciatic was stretched for a painful gangrenous ulcer of the foot. The ulcer became cleaner, the pain went away, and the patient asked that the operation might be repeated on the left side for a similar condition of that foot. The amount of relief, however, was less here, for, though the ulcer became a little cleaner for a few weeks, gangrene eventually supervened in both feet, and the patient died five months later.

In two cases in which the pain recurred four months and one



year, respectively, after the sciatic had been stretched, the external popliteal of the same side was stretched with good result.

Considerable relief was obtained from stretching the supra-orbital in a case in which mercury and potassium iodide had failed to effect much change in the thickening and neuralgia. The thickening remained while the pain disappeared.

*Anæsthesia.*—In 33 of the 100 cases the operation was performed for anæsthesia, but in very many instances no difference whatever was noticed after the operation. In some of the earlier cases there appeared to be some improvement in sensation for as long as a year after the operation, and in other cases slight temporary diminution of anæsthesia was noted. On the whole, the results of nerve stretching for anæsthesia cannot be considered satisfactory.

*Tuberculation.*—In eighteen cases nerves were stretched in order to determine if any effect could be thus produced on the growth of tubercles or on leprous infiltration of the skin. Measurements of the fingers were taken, but the result proved absolutely negative.

*Necrosis.*—In two cases nerve stretching seemed to facilitate the separation of dead bone. There was increased discharge from the sinuses, and fragments of bone were removed ten days and eleven days respectively after the operation.

The results may be summarized as follows:

1. More or less relief was obtained in 47 of the 100 cases, or nearly half.
2. The nerve when exposed was found to be enlarged in forty-eight cases, or nearly half.
3. The chief indications for the operation are perforating ulcer, some cases of necrosis, and pain associated with perforating ulcer or peripheral neuritis.
4. The great sciatic is the most satisfactory nerve to stretch, as it is nearer the spinal ganglia.

The following case illustrates fairly well the results to be obtained from nerve stretching:

*CASE II.—Mixed Leprosy; Gangrenous Ulcers of both Feet; Stretching of both Sciatics; Temporary Relief; Eventual Gangrene of both Feet; Death.*

Charles Vesprey, colored, aged 21, was admitted to the Trinidad Leper Asylum on May 13, 1886, with mixed leprosy of six

year's duration. The extremities were wasted and anæsthetic for the greater part of their extent, and the skin was dry and scaly. The fingers were ulcerated and the dorsa of the feet were occupied by large ulcers.

Oct. 18. The ulcer on the outer side of the right foot had become gangrenous.

Oct. 22. The ulcer had become a little cleaner after being dressed with charcoal poultices.

Nov. 3. The ulcer was spreading fast on the right foot, and the cicatrix of the old ulcer on the left foot was also breaking down. The patient was given chloroform, and the right sciatic was exposed and forcibly stretched. The fibres were rather brittle.

Nov. 5. The ulcer on the right foot was clean and beginning to heal. That on the left foot was also much cleaner and had less smell.

Nov. 9. The right ulcer was still healing. The left was quite clean and almost dry. He said the left foot was less painful when put to the ground.

Nov. 12. Patient sat up.

Nov. 29. There were thick healthy granulations over the ulcer of the right foot. There was no odor.

On the dorsum of the left foot was a large, unhealthy looking ulcer, with very offensive smell. On its floor were greyish-yellow patches of lymph. The foot was swollen and painful.

As the patient requested that the operation which was done on the right side might be repeated on the left, he was given chloroform, and the left sciatic was stretched.

Dec. 1. The ulcer on the left foot was cleaner, and the patient was sitting up.

Dec. 11. The ulcers on both feet were healing well.

Dec. 27. Gangrene was commencing in the ulcer of the left foot.

Dec. 29. Dead bone and slough was removed from the left great toe.

Jan. 24. The ulcer was clean again.

March 14. It again became gangrenous, and the patient about this time complained of dryness of the throat and tongue, and diarrhœa.

April 25. The ulcers on both feet were becoming gangrenous again.

May 6. Patient died this morning. He had been gradually sinking for the last fortnight.

At the necropsy the body was found to be extremely wasted. The tubercles on the face had been absorbed. Gangrenous ulcers involved the greater part of both feet. The fingers were ulcerated. The median nerves were dusky in color and much thickened. The sciatics showed no evidence of having been stretched, and appeared normal. In the right lung was an ulcer almost the size of a cob-nut, and with thickened walls. Higher up was a small patch of consolidation. The pleura was adherent at the right apex.

The most interesting point in this case was the improvement which took place in the ulcers of both feet after the right sciatic had been stretched. This seems to support the theory that the changes are due to shaking of the spinal ganglia. The improvement was unfortunately only temporary, the patient dying soon after from exhaustion and septic absorption consequent on the progress of the leprosy.

*Removals.*—Necrosis of bone, as was pointed out above, is extremely common, especially in anæsthetic leprosy, and the removal of sequestra is frequently required.

Of 630 removals of dead bone and cartilage, 532 were in anæsthetic lepers, and 92 in mixed lepers, while only six were in those suffering from the tuberculated variety. Ulcers and sinuses usually granulate and heal readily after removal of dead bone or cartilage, though in some cases, as was already shown, amputation is afterwards necessary.

Excision of tubercles from the face, trunk or extremities is often followed by encouraging results for a time. In an article published some years ago,\* I gave some photographs showing the amount of relief which might be expected from the operation. After free excision I usually apply strong carbolic acid and then dust over with tannin to form crusts. When the knife has gone well beneath the tubercles recurrence does not take place in the cicatrix. Unfortunately, in a year or two fresh tubercles appear in the surrounding skin and in other parts of the body, and the only hope of further relief lies in repeating the operation.

The removal of tubercles from the conjunctiva is unsatisfactory, for the cornea is usually involved early, and complete extirpation of the mass is then impossible.

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\* *Brit. Med. Journal*, June 9, 1888, p. 1214.



Troublesome exuberant granulations sometimes make their appearance in lepers at the orifices of sinuses or in the ulcers of the fingers. Such granulations were removed fifteen times.

Keloid was excised three times in the same patient. The growth recurred in the original site at short intervals. It was probably unconnected with the leprosy, and it may here be remarked that keloid is very common in negroes—more so, I think, than in white subjects.

Fibroma was removed three times—twice in one patient and once in another. It also appeared to have no connection with the leprosy.

Troublesome papillomata sometimes form on the feet of lepers, apparently as a result of disordered nutrition. Removal was necessary in one case.

Yaw not infrequently occurs in lepers, though the two diseases are entirely distinct. Obstinate yaw tubercles can sometimes be excised with advantage, mercury and potassium iodide being given internally at the same time. This procedure was adopted in two cases.

Of excision of the eyeball, of hæmorrhoids or of an enlarged gland it is unnecessary to speak in detail. The latter was situated above the elbow, and had become enlarged in consequence of absorption from ulcers of anæsthetic fingers.

The belly of the gastrocnemius was removed in the case of an old standing ulcer situated on the calf. The mass of muscles was standing out from the edges of the ulcer and was covered with exuberant granulations. After excision, grafting with skin from the same patient gave good results, though the woman left the asylum too soon for a complete cure to be effected.

A solitary cyst was removed from a patient with mixed leprosy. It was situated close to the lower ribs beneath the fibre of the latissimus dorsi. Numerous daughter cysts were found in its cavity, but no hooklets.

*Ligatures.*—The vessels supplying tubercles of the conjunctiva were ligatured in five instances. This operation sometimes checks the growth of the tubercle temporarily, but at the best, it is only palliative. Collateral circulation soon becomes established and the tubercle goes on increasing.

Ligature of hæmorrhoids was performed as in non-leprous patients and with similar results.

*Incisions.*—Under this head come what are probably the most important operations in leprosy. I refer to incisions of ulcers, or sinuses, or incisions of leprosy tissue made in order to relieve tension. The total of these operations was 1,016. During the six years under consideration it has been my practice to incise freely down to bone on the first indication of necrosis of leprosy extremities. This treatment I am convinced has been largely instrumental in averting gangrene or diffuse suppuration. When I first came to the asylum these complications were not infrequent. Now they are almost unknown.

A modification of this treatment has lately been applied to perforating ulcers with good results.\* A bistoury is passed through from the sole to the dorsum of the foot, and all tissues are divided forward, the bistoury being brought out between the toes. If the ulcer happens to be nearer one side of the foot, the bistoury is brought out laterally. The gaping wound thus made is stuffed with lint and allowed to granulate up from the bottom. Hæmorrhage is usually slight and is easily controlled by the wedge of lint in the wound and by bandaging. This treatment of perforating ulcer has been adopted twenty-four times. The following is a typical case:

CASE III.—*Anæsthetic leprosy; Perforating ulcer of right foot; Bistoury passed through the dorsum and foot slit open forward; Firm cicatrix in six months; Death two and a quarter years later from suppuration and gangrene of left arm.*

Sibu, Hindu, aged 44, was admitted to the Trinidad Leper Asylum on March 1, 1887, with anæsthetic leprosy of five years' duration.

March 18, 1889. Several fragments of bone were removed from a perforating ulcer of the right sole.

June 15. A probe was passed through this ulcer to the dorsum of the foot and a counter opening was made.

July 29. A bistoury was passed through to the dorsum, and all the tissues were slit up forward to between the toes. The incision was stuffed with lint.

August 5. The wound was granulating well and there was no pain. Another sinus was slit up.

August 16. The necrosed head of a bone was loose and was removed.

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\* *Brit. Med. Journal*, Nov. 8, 1890, p. 1059.



August 21. The incision was healing well from the bottom.

February 1, 1890. The incision was firmly healed, and there was a long thin cicatrix. There was an old chronic ulcer on another part of the foot, but not perforating and not painful.

May 16, 1892. There was brawny swelling of the left arm. A sinus was slit up.

May 20. The swelling had extended to the elbow. An abscess was incised just below the elbow.

May 25. The swelling of the hand, forearm and arm, were going down. The tissues over the elbow were separating in large sloughs. He died the same evening.

The necropsy next day showed abscesses burrowing in the left forearm and half way up the arm. The tissues about the elbow were gangrenous.

The body was fairly nourished. A firm, thin cicatrix on the dorsum and sole of the right foot marked the former incision of the perforating ulcer. Viscera normal.

It is interesting to notice in this case that in spite of the rapid destruction of tissue which was going on in the left upper extremity, the cicatrix in the right foot remained properly firm and there was no recurrence of ulceration here.

The next case shows in a very remarkable way the recuperative power of leprosy tissues after free incision.

CASE IV.—*Anæsthetic Leprosy; Extravasation of Urine; Free incisions; Sloughing of Scrotum; Urinary Fistula; Ultimate complete recovery.*

Edward Rawlins, negro, aged 25 years, was admitted to the Trinidad Leper Asylum on Nov. 11, 1884, with a history of anæsthetic leprosy for five months.

During the first three years of his stay in the asylum, it was found necessary to amputate both great toes for necrosis, and various sinuses were incised, and fragments of dead bone removed from both feet.

It was noted also that he sometimes complained of vertigo and tinnitus. He had hallucinations and fits of anger which seemed to be almost maniacal. Otherwise he was in fair general health.

Dec. 12, 1887. Temp. 101°. Pulse fair. Tongue much furred. Bilious vomiting. The left side of the scrotum was tense, dusky red, very tender, and covered with blebs. A

hard painful swelling extended up the inguinal canal to the abdomen, but there was no impulse and the bowels were free. Attempts to pass a No. 10 catheter failed. A little blood-stained urine followed after it was withdrawn.

He was given chloroform, and the tissues of the scrotum and perinaeum were freely incised, the right testis and epididymis being exposed. Much dirty, highly ammoniacal fluid escaped. The inguinal canal was found to be quite free and the finger was passed up to the internal ring. A counter-opening was made at the lowest part of the scrotum, and a drainage tube was passed down by the side of the testis. A No. 10 catheter was passed and tied in. Only a little blood came from the catheter.

6 p. m. The pain was much less. Said urine had passed by the side of the catheter and from the incision in the scrotum.

Dec. 13. Temp.  $101.5^{\circ}$ . Much urine had passed by the side of the catheter, and urine had also risen in the catheter. Much blood-stained discharge from incisions. Tissues round lowest incision sloughing. Tongue very much furred. Some pain on pressure over bladder and inguinal canal, but much less than yesterday.

Dec. 14. Said urine was not flowing from incision in scrotum. Catheter and drainage tube were removed. Urine ammoniacal. Sloughing going on round incisions.

Dec. 16. Temp.  $101.4^{\circ}$ . Urine passed freely by penis, but followed by blood and pain. Sloughing of tissues was progressing on left side of scrotum and up left cord. In line of left inguinal canal and Poupart's ligament to anterior superior spine of ilium was brawny hardness, redness and intense tenderness, and apparently deep fluctuation.

Dec. 17. Temp.  $101.4^{\circ}$ . Swelling and redness had increased along Poupart's ligament, and there was undoubted fluctuation. An incision about an inch long was made over the anterior superior spine, and several ounces of thin, dirty pus escaped. Sloughing was progressing in the scrotum but there was no escape of urine from the incisions.

Dec. 18. Temp.  $100.3^{\circ}$ . Tongue a little less furred. The incision made yesterday was discharging freely and there was far less tenderness on pressure. Line of demarcation was forming on scrotum and sloughs were separating. Left testis and epididymis were sloughing out.

Dec. 19. Temp. 100.4°. There was still some tenderness over Poupart's ligament, and pus could be squeezed out along cord. Pus was still escaping from the incision over the anterior superior spine.

Dec. 20. Temp. 103.2°. Pus could still be pressed down along cord.

Dec. 23. Temp. 103.2°. A large piece of slough had separated from the scrotum, leaving both testes exposed. Urine was dribbling through a fistula on the left side of the scrotum. None came by the penis. There was still fullness and tenderness in the left groin.

Dec. 24. Temp. 101°. Hardly any pain in the groin, but a little has escaped along cord. Granulations on scrotum were clean. Tongue clean. Appetite good.

Dec. 27. Fever gone. Sat up. Pain and swelling had gone from groin. Some urine had flowed by penis yesterday, and some regurgitated and came through fistula.

Dec. 30. Clean granulating surface on scrotum exposing both testes. All the urine was coming by the fistula, causing pain on the left side of the scrotum when it passed.

Jan. 2, 1888. A No. 9 catheter was passed without much difficulty and tied in. Urine flowed through it. The catheter however came out the same afternoon.

Jan. 4. Walking about. Urine passed by penis, but some still came by fistula.

Jan. 9. Scrotum was granulating and healing well. Most of urine came by penis. Was wearing a suspensory bandage and walking about.

Jan. 25. All urine passed by penis. Two small granulating surfaces, one on each side of the scrotum, were healing fast. They entirely healed soon after.

In this patient, who was a confirmed leper of some years' standing, who had been constantly losing bone from necrosis, and from whom pieces of bone are still being removed from time to time, there was enough sloughing of the tissues of the scrotum and perineum, from the extravasated urine, and enough septic absorption to kill many subjects who are not lepers. He, however, made a perfect recovery.

In the diffuse brawny swelling which often occurs without supuration in the legs and arms of lepers, I find long incisions



from the knee to the ankle, or from the ankle to the toes, or from corresponding distances in the upper extremities, of great value in relieving pain and tension. The patients often ask for these incisions.

An inflamed patellar bursa, and a cyst in front of the ear were also incised with great relief to the patient and ultimate cure.

Incisions for elephantiasis Arabum have been already referred to, as preceding amputation. A diminution of three inches in the circumference of the leg was obtained, but the incisions soon closed, and the leg became as large as before the operation.

Tracheotomy was performed in a patient who had leprosy of the larynx, the patient eventually dying of phthisis. This operation has been very successful in Norway. Lepers there have worn tracheotomy tubes for several years. The following are notes of the Trinidad patient:

CASE V.—*Mixed leprosy; Tuberculation of larynx; Tracheotomy; Death four months later from phthisis.*

Reginald Dewitz, white, aged 34, of German and English parentage, was admitted to the Trinidad Leper Asylum on Dec. 3, 1886, with mixed leprosy of eleven years' duration.

He complained of sore throat when admitted, but there was no dyspnœa till about two years later. From this time the difficulty in breathing gradually increased.

March 4, 1890. Breathing was becoming very difficult. The face was blue and the capillaries were injected. The hands were also blue.

March 26. He had a severe attack of dyspnœa.

March 30. A caseous gland was incised in the neck.

April 6. The asphyxia was getting worse every day, the patient becoming more and more blue.

April 16. Tracheotomy was performed to-day. At the patient's request no chloroform was given. He bore the operation very well. There was immediate relief and the face became less blue.

April 17. The breathing was quiet and the patient said he experienced great relief. The inner tube was taken out and cleaned, and much tenacious mucus was found.

April 18. The tube was almost blocked with thick mucus.

April 19. There was a good color in the face. Less discharge in the tube.

April 25. As he complained of scratching in the throat, the silver tube was replaced by a vulcanite one.

April 29. When he stopped the opening of the tube with his finger he found he could talk better than before the operation.

May 9. He had a slight cold, but was walking about freely out of doors. The damp steamy weather seemed to favor the case.

May 29. An abscess on the left side of the neck was incised. Glairy pus escaped.

June 25. The glands on the right side of the neck were enlarging rapidly.

July 11. These glands had suppurated and thick glairy pus escaped on incision.

From this time he lost flesh and gradually sank. He died on August 6.

The necropsy next day showed great wasting of the body, and suppurating glands in the neck. The ulcers on the hands, legs, and feet were becoming gangrenous. The median nerves were much thickened above the wrists.

The epiglottis, aryteno-epiglottic folds and vocal cords were thickened and ulcerated, also the mucous membrane of the larynx below the cords. There was no ulceration of the trachea below the tracheotomy opening.

The pleurae were adherent and both lungs were full of grey miliary tubercles. These were beginning to caseate and break down at the right apex. The lungs were quite solid in places from agglomeration of tubercles.

The liver was shrunken, tough and cirrhotic. The spleen weighed 21.02 and was hypertrophied. The kidneys weighed 14.02 and were lardaceous. There were a few ounces of straw-colored fluid in the abdomen. Numerous leprosy bacilli were found in the spleen, liver, kidney and femoral gland.

In this case, despite the fact that nearly every tissue and viscus in the body was diseased, there is little doubt that life was prolonged for nearly four months by tracheotomy.

Circumcision has been done sixteen times: ten times in tuberculated, three times in anæsthetic, and three times in mixed lepers. As will be inferred from these figures, the operation was usually done for phimosis, due to tuberculation of the prepuce. The incisions though close to or through tuberculated tissue healed rapidly.



*Intestinal Operations.*—Operations on the intestine were only two in number: herniotomy and linear cauterization of a prolapsed rectum. The former operation was done for strangulated inguinal hernia in an anæsthetic leper of thirty-two years' standing, the oldest case in the asylum. A firm cicatrix formed in twenty-two days. This is so striking an instance of the rapid healing which takes place in lepers that a few notes of the case may be of interest.

CASE VI.—*Anæsthetic Leprosy; Strangulated Inguinal Hernia; Herniotomy; Firm Cicatrix in Twenty-Two Days; Death Fourteen Months Later from Chronic Parenchymatous Nephritis.*

Charles Samuel, white Creole, aged 20, was admitted to the Trinidad Leper Asylum on August 10, 1859, with anæsthetic leprosy of six years' duration.

Oct. 19, 1885, he complained of great pain in the right side of the abdomen. He had for a long while suffered from inguinal hernia and had worn a truss. To-day, however, the finger could be passed well within the external ring. There was no dullness on percussion.

Oct. 25. The hernia came down at six p. m. after a fit of coughing. When examined at 8:30 p. m. taxis failed to reduce it. He was given chloroform, but the hernia was still irreducible. The swelling was then incised and the neck of the sac divided, but the hernia still would not go back. The sac was then punctured and a little clear fluid escaped. The neck of the sac was now incised from within and the hernia returned. A drainage tube was put in and two silk sutures. He was ordered tinct. opii, ℞xv., quartes horis.

Oct. 26. Temp. 96.5°; pulse 76, good: vomited everything and complained of pain in region of umbilicus. As the pain and vomiting continued, the sutures were removed in the afternoon and the inguinal canal explored digitally. No bowel could be felt. A little flatus had passed but no fæces.

Oct. 27. Temp. 98°; pulse 84. The pain and vomiting continued and the face was pinched. Very little urine had passed and no fæces.

Oct. 28. Temp. 92.2°. Flatus passed this morning but no fæces. Vomiting had ceased and pain had almost gone. The

wound had nearly healed, and the drainage tube had come out, the laniandum to be repeated three times a day.

Oct. 30. The bowels were freely moved this morning. The tongue was rather furred. Asked for more food. Half the incision had healed by primary union, the other half was granulating well. The abdomen was less tense.

Nov. 2. There was some hardness and pain on pressure in the inguinal region; there was free discharge from the incision; tongue clean; bowels open once or twice a day. Allowed fish.

Nov. 6. A very small granulating surface was left. There was still much thickness and hardness in the inguinal region, in great part due to enlarged glands. Bowels regular; appetite good. Allowed fowl.

Nov. 16. Incision had completely healed.

Nov. 20. Wearing a new truss. After this the hernia did not again come down.

Nov. 29, 1886. Oedema of legs and of penis and scrotum; urine sp. gr. 1006, dense precipitate with nitric acid.

From this time he gradually sank.

He died on Jan. 30, 1887. The necropsy next day showed much wasting of the body. The ulnar and median nerves also appeared wasted. The spleen weighed 17.02; its capsule was thickened and studded with yellow and white masses in places. The right kidney weighed 3.02; the left 6.02. They were deeply scarred. The capsules were adherent to the cortices, the latter were quite gone in places. In other parts there was evident tubal change.

On examining the tissues at the site of the herniotomy, only a faint external cicatrix was found. Internally there was no evidence of former hernia.

From the state of the kidneys after death it is pretty clear that they must have been diseased at the time of the operation. Nevertheless, in spite of the mixed kidney disease, a chronic parenchymatous nephritis, and of the leprosy of 32 years' standing, the patient made a perfect recovery and was able to wear a truss in a little over three weeks.

Linear cauterization with a black hot wire, as recommended by Harrison Cripps, was performed in a prolapsed ulcerated rectum occurring in an old standing case of anæsthetic leprosy. The

case has been published.\* The operation gave relief, but the patient died at last of dysentery and abscess of the liver.

*Ophthalmic Operations.*—Cataract is common in lepers, and extraction was performed five times. In one case†, a demented and very anæsthetic leper, the result was most surprising. The patient was so devoid of sensation that the operation was done without any anæsthetic. In spite of this the wound healed readily, and he was able to count fingers at the distance of ten feet. A similar operation on the other side was unsuccessful. The patient had an unfortunate habit of tearing off bandages, a result of his disordered state of mind.

Iridectomy has been performed from time to time in cases of tubercle of the cornea, in order by means of an artificial pupil to avert total blindness. This measure is only very temporary, for the tuberculated mass gradually advances across the cornea, and blindness is only a question of time.

Pterygium is very common in Trinidad, as in other hot places, and many cases occur at the Leper Asylum. Operative interference has only been partially successful.

Tattooing of the eye was done for cosmetic effect in one patient who was a little vainer than the others.

*Miscellaneous Operations.*—These speak for themselves. It is interesting to note that the skin grafting, as already mentioned, was done from a leper, and that nevertheless the grafts took well.

Paracentesis is occasionally necessary for the dropsy which accompanies the renal disease so common in lepers. I have found that 25 per cent. of the kidneys examined in lepers after death are diseased.

The above short notes and tables, imperfect though they are, will, I think, show that operative interference in lepers is capable of affording much relief to the sufferings of this unfortunate class of patients, and the argument is still more forcibly borne out by the eagerness with which the inmates of the asylum in Trinidad beg for surgical aid, when the occasion for it arises.

\* *Lancet*, Nov. 12, 1887, p. 958.

† *Lancet*, Sept. 25, 1886, p. 581.



